Epidemiology of Traumatic Dental Injuries
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Abstract
The oral region comprises 1% of the total body area, yet it accounts for 5% of all bodily injuries. In preschool children, oral injuries make up as much as 17% of all bodily injuries. The incidence of traumatic dental injuries is 1%–3%, and the prevalence is steady at 20%–30%. The annual cost of treatment is US $2–$5 million per 1 million inhabitants. Etiologic factors vary between countries and with age groups. Important public health implications such as how to best organize emergency dental care and how to prevent dental injuries, decrease cost, and increase lay knowledge are important factors needed to change epidemiologic data toward more favorable figures in the future. (J Endod 2013;39:S2–S5)

Key Words
Dental trauma, emergency, etiology, incidence, injuries

At least 4 million people die from trauma every year. Half of all deaths are in the 10–24 year age group, and trauma is the number 1 killer of individuals up to 40 years of age (1). Moreover, several hundred million people are injured by trauma every year (1). Trauma has a multitude of consequences for the traumatized individual, family members, and society. The impact is not only physical but also psychosocial and economic.

Oral Injuries in Relation to Non-oral (Bodily) Injuries
Oral injuries are most frequent during the first 10 years of life, decreasing gradually with age, and are very rare after the age of 30, whereas bodily nonoral injuries are seen most frequently in adolescents and young adults and are common throughout life (2, 3). Although the oral region comprises as small an area as 1% of the total body area, it accounts for 5% of all bodily injuries. In preschool children, oral injuries make up as much as 17% of all bodily injuries, with injuries to the head being the most common. This is in contrast to later in life when injuries to hands and feet are the most common (2).

Simultaneous injuries to different oral tissues are commonly seen in patients presenting with oral trauma. Of all patients seeking consultation or treatment for injuries to the oral region, dental injuries are the most common and are seen in as many as 92% of patients presenting with oral injuries, whereas soft-tissue injuries to the same patients are seen in 28%, often simultaneously with dental injuries. Fractures involving the jaw are seen more rarely, in only 6% of all patients presenting with oral injuries (2, 4).

Incidence
The incidence of dental injuries in children is, in most studies, in the range of 1%–3% in the population (5). The highest incidence for dental injuries per 1000 individuals is found up to 12 years of age; in higher ages, the incidence is lower (6). Boys are generally more often injured than girls (7, 8). Some individuals are considered higher risk takers; they suffer from repeated dental trauma episodes (6, 9–12).

Prevalence and Trends
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Economic Impact
The total lifetime costs of accidental bodily injuries in the United States has been calculated to be US $406 billion (23, 24), which is 4.2% of the gross domestic product. This figure corresponds well with a Swedish study, in which the overall costs of accidental bodily injuries also were estimated to be 4% of the gross national product.
The costs for loss in only productivity caused by accidental bodily injuries (US $326 billion) was due to lost wages, benefits, marketable goods and services, and the loss of ability to perform daily responsibilities at home (24).

Cost of Dental Trauma

Studies have shown that complicated injuries to teeth are of major significance with respect to time and cost (16, 26–29). In a Swedish study, direct costs (average treatment time, costs of health care professionals and other labor, capital costs, and supplies) plus indirect costs (costs due to loss of production or leisure) were estimated to be US $3.3–$4.4 per 1 million individuals in patients up to 19 years of age (26). However, we know that much of the expensive treatment is carried out in the adult years. In Denmark, the annual cost of treatment only (acute trauma service, follow-up, and subsequent restoration) of traumatic dental injuries (including adults) ranges from US $2–$5 million per million inhabitants per year (16).

Dental trauma is more time-consuming and costly to treat than many other outpatient accidental injuries. The average number of visits treated on an outpatient basis during 1 year because of a dental trauma to a permanent tooth has been shown to range from 1.9–9.1 (27, 30–32), whereas a similar figure for bodily injuries is 1.5 (35).

Etiologic Factors and Variations between Countries and Societies

Etiologic factors are very much related to the age of the patient. In preschool children, falls are the most common cause of oral injuries, whereas in school age children, injuries are most often caused by sports or hits by another person. In adolescents and young adults, assaults and traffic accidents are the most common etiologic factors (34, 35). In this group, oral injuries are often related to alcohol (36, 37) and occur most frequently during leisure hours and during weekends (2, 37). They are associated with the lifestyle that is prevalent today in many Western societies (2, 4, 36, 38).

In the developing world, traffic accidents are the most common cause of injuries and deaths. The same pattern was observed some decades ago in many Western countries, but traffic preventive measures in these countries have decreased the number of accidents dramatically, although the number of cars has increased considerably. Some countries have been very successful in reducing the number of deaths and injuries caused by traffic.

Prevention

It is difficult to prevent dental injuries, but sports injuries appear to offer some opportunities for prevention by the use of properly fitted custom-made mouthguards in contact sports such as boxing, ice hockey, rugby, and American football. There is a lack of evidence as to efficacy of different mouthguards in well-designed studies (39). The World Health Organization Health Promoting School program suggests that finding solutions for dental trauma is a public health problem (40). In society, a wide range of actions can be implemented (3, 41):

- Personal and social education aimed at developing life skills
- School policies against bullying and violence
- Physical environment changes
- School health policies
- Alcohol policies
- School provision of mouthguards
- Links with health services

Increasing Lay Knowledge

The prognosis is decided at the place of accidents for many injuries. Appropriate first aid measures should be carried out as soon as possible after trauma (42–45). For avulsed teeth, it is critical that not just the professionals have first aid knowledge. Key individuals close to the injured child such as children, parents, teachers, school nurses, health care professionals, and coaches should ideally know what to do with an avulsed permanent tooth at the scene of an accident. Yet most studies have reported a low level of knowledge about how to deal with first aid dental trauma (46–53).

The lack of adequate knowledge of first aid for dental injuries among lay people is probably due to the fact that acute dental trauma care generally is not included in their education or in first aid textbooks (54, 55). There have been attempts made to increase dental trauma first aid knowledge in dental trauma. For example, a short lecture followed by a discussion about replantation of avulsed teeth has been shown to be an effective method to increase dental trauma first aid knowledge (3, 48, 56–59). The distribution of leaflets or posters with first aid information (3, 60–62) also has been shown to be an effective method. Emergency telephone services can be helpful for cases related to dental trauma and may provide valuable support provided that people are aware of the emergency telephone numbers and that there is an emergency service organized (63).

The development of technology has increased access to information. A recent study pointed out that the most preferred sources of information regarding the emergency management of tooth avulsion, regardless of sociodemographic characteristics, are the Internet for young people and the television for elderly people (64). Information on the Internet must be reliable and should, therefore, be given by a medical professional (64). Smartphones also can be used to reach professional information about dental trauma first aid measures. One such an app for the public is DENTAL TRAUMA, which can be downloaded onto iPhones and Android phones.

Organization of Emergency Care

The prognosis for some dental injuries (eg, avulsion injuries) depends on early and correct treatment (45). For this reason, it is important that a dental emergency service be organized in each geographic region. Ideally, such a service would be provided on a 24-hour basis. During office hours, dental clinics can provide emergency service. However, because the majority of dental injuries occur outside office hours (2) other solutions also must be provided. A well-functioning emergency service outside office hours can be provided via a central dental emergency clinic or hospital.

Studies have shown that treatment of dental trauma in emergency care services is often inadequate (65–67) and that patients are not always satisfied with the care provided. The International Association of Dental Traumatology has issued guidelines for emergency management of traumatic dental injuries, which can be accessed on the Internet (www.iadt-dentaltrauma.org). An interactive website has been introduced for clinicians where guidance is given for every unique emergency case and the dentist can provide data from the individual case (Dental Trauma Guide, www.dentaltraumaguide.org). The advantage with the Internet is that guidelines for emergency situations are more accessible worldwide than printed books and manuals. A link to the Internet, either via computer or smartphone, is enough to gain direct information for emergency management.

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